

WHAT IS CLAIMED IS:

1. A nucleic acid segment comprising a nucleic acid sequence encoding a 3-keto-acyl-CoA reductase protein, wherein the nucleic acid sequence is selected from the group consisting of:
 - a nucleic acid sequence at least about 80% identical to SEQ ID NO:8;
 - a nucleic acid sequence that hybridizes under stringent conditions to SEQ ID NO:8 or the complement thereof;
 - a nucleic acid sequence encoding a protein at least about 80% identical to SEQ ID NO:9; and
 - a nucleic acid sequence encoding a protein that is immunoreactive with an antibody prepared using SEQ ID NO:9 as an antigen, the antibody being immunoreactive with SEQ ID NO:9.
2. An isolated 3-keto-acyl-CoA reductase protein comprising an amino acid sequence selected from the group consisting of:
 - an amino acid sequence at least about 80% identical to SEQ ID NO:9; and
 - an amino acid sequence that is immunoreactive with an antibody prepared using SEQ ID NO:9 as an antigen, the antibody being immunoreactive with SEQ ID NO:9.
3. A recombinant vector comprising in the 5' to 3' direction:
 - a) a promoter that directs transcription of a structural nucleic acid sequence encoding a 3-keto-acyl-CoA reductase protein;
 - b) a structural nucleic acid sequence encoding a 3-keto-acyl-CoA reductase protein; wherein the structural nucleic acid sequence is selected from the group consisting of:
 - a nucleic acid sequence at least about 80% identical to SEQ ID NO:8;
 - a nucleic acid sequence that hybridizes under stringent conditions to SEQ ID NO:8 or the complement thereof;
 - a nucleic acid sequence encoding a protein at least about 80% identical to SEQ ID NO:9; and
 - a nucleic acid sequence encoding a protein that is immunoreactive with an antibody prepared using SEQ ID NO:9 as an antigen, the antibody being immunoreactive with SEQ ID NO:9; and
 - c) a 3' transcription terminator.
4. A recombinant host cell comprising a nucleic acid segment encoding a 3-keto-acyl-CoA reductase protein, wherein the nucleic acid segment is selected from the group consisting of:
 - a nucleic acid sequence at least about 80% identical to SEQ ID NO:8;
 - a nucleic acid sequence that hybridizes under stringent conditions to SEQ ID NO:8 or the complement thereof;

a nucleic acid sequence encoding a protein at least about 80% identical to SEQ ID NO:9; and

a nucleic acid sequence encoding a protein that is immunoreactive with an antibody prepared using SEQ ID NO:9 as an antigen, the antibody being immunoreactive with SEQ ID NO:9.

5. A genetically transformed plant cell comprising in the 5' to 3' direction:
 - a) a promoter that directs transcription of a structural nucleic acid sequence encoding a 3-keto-acyl-CoA reductase protein;
 - b) a structural nucleic acid sequence encoding a 3-keto-acyl-CoA reductase protein; wherein the structural nucleic acid sequence is selected from the group consisting of:
 - a nucleic acid sequence at least about 80% identical to SEQ ID NO:8;
 - a nucleic acid sequence that hybridizes under stringent conditions to SEQ ID NO:8 or the complement thereof;
 - a nucleic acid sequence encoding a protein at least about 80% identical to SEQ ID NO:9; and
 - a nucleic acid sequence encoding a protein that is immunoreactive with an antibody prepared using SEQ ID NO:9 as an antigen, the antibody being immunoreactive with SEQ ID NO:9;
 - c) a 3' transcription terminator; and
 - d) a 3' polyadenylation signal sequence that directs the addition of polyadenylate nucleotides to the 3' end of RNA transcribed from the structural nucleic acid sequence.

6. A genetically transformed plant comprising in the 5' to 3' direction:
 - a) a promoter that directs transcription of a structural nucleic acid sequence encoding a 3-keto-acyl-CoA reductase protein;
 - b) a structural nucleic acid sequence encoding a 3-keto-acyl-CoA reductase protein; wherein the structural nucleic acid sequence is selected from the group consisting of:
 - a nucleic acid sequence at least about 80% identical to SEQ ID NO:8;
 - a nucleic acid sequence that hybridizes under stringent conditions to SEQ ID NO:8 or the complement thereof;
 - a nucleic acid sequence encoding a protein at least about 80% identical to SEQ ID NO:9; and
 - a nucleic acid sequence encoding a protein that is immunoreactive with an antibody prepared using SEQ ID NO:9 as an antigen, the antibody being immunoreactive with SEQ ID NO:9;
 - c) a 3' transcription terminator; and
 - d) a 3' polyadenylation signal sequence that directs the addition of polyadenylate nucleotides to the 3' end of RNA transcribed from the structural nucleic acid sequence.

7. A method of preparing host cells useful to produce a 3-keto-acyl-CoA reductase protein, the method comprising:
- selecting a host cell;
 - transforming the selected host cell with a recombinant vector having a structural nucleic acid sequence encoding a 3-keto-acyl-CoA reductase protein, wherein the structural nucleic acid sequence is selected from the group consisting of:
 - a nucleic acid sequence at least about 80% identical to SEQ ID NO:8;
 - a nucleic acid sequence that hybridizes under stringent conditions to SEQ ID NO:8 or the complement thereof;
 - a nucleic acid sequence encoding a protein at least about 80% identical to SEQ ID NO:9; and
 - a nucleic acid sequence encoding a protein that is immunoreactive with an antibody prepared using SEQ ID NO:9 as an antigen, the antibody being immunoreactive with SEQ ID NO:9; and
 - obtaining transformed host cells.
8. A method of preparing plants useful to produce a 3-keto-acyl-CoA reductase protein, the method comprising:
- selecting a host plant cell;
 - transforming the selected host plant cell with a recombinant vector having a structural nucleic acid sequence encoding a 3-keto-acyl-CoA reductase protein, wherein the structural nucleic acid sequence is selected from the group consisting of:
 - a nucleic acid sequence at least about 80% identical to SEQ ID NO:8;
 - a nucleic acid sequence that hybridizes under stringent conditions to SEQ ID NO:8 or the complement thereof;
 - a nucleic acid sequence encoding a protein at least about 80% identical to SEQ ID NO:9; and
 - a nucleic acid sequence encoding a protein that is immunoreactive with an antibody prepared using SEQ ID NO:9 as an antigen, the antibody being immunoreactive with SEQ ID NO:9;
 - obtaining transformed host plant cells; and
 - regenerating the transformed host plant cells.
9. A nucleic acid segment comprising a nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein, wherein the nucleic acid sequence is selected from the group consisting of:
 - a nucleic acid sequence at least about 80% identical to SEQ ID NO:10;
 - a nucleic acid sequence that hybridizes under stringent conditions to SEQ ID NO:10 or the complement thereof;
 - a nucleic acid sequence encoding a protein at least about 80% identical to SEQ ID NO:11; and

a nucleic acid sequence encoding a protein that is immunoreactive with an antibody prepared using SEQ ID NO:11 as an antigen, the antibody being immunoreactive with SEQ ID NO:11.

10. An isolated polyhydroxyalkanoate synthase protein comprising an amino acid sequence selected from the group consisting of:
an amino acid sequence at least about 80% identical to SEQ ID NO:11; and
an amino acid sequence that is immunoreactive with an antibody prepared using SEQ ID NO:11 as an antigen, the antibody being immunoreactive with SEQ ID NO:11.
11. A recombinant vector comprising in the 5' to 3' direction:
 - a) a promoter that directs transcription of a structural nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein;
 - b) a structural nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein; wherein the structural nucleic acid sequence is selected from the group consisting of:
a nucleic acid sequence at least about 80% identical to SEQ ID NO:10;
a nucleic acid sequence that hybridizes under stringent conditions to SEQ ID NO:10 or the complement thereof;
a nucleic acid sequence encoding a protein at least about 80% identical to SEQ ID NO:11; and
a nucleic acid sequence encoding a protein that is immunoreactive with an antibody prepared using SEQ ID NO:11 as an antigen, the antibody being immunoreactive with SEQ ID NO:11; and
 - c) a 3' transcription terminator.
12. A recombinant host cell comprising a nucleic acid segment encoding a polyhydroxyalkanoate synthase protein, wherein the nucleic acid segment is selected from the group consisting of:
a nucleic acid sequence at least about 80% identical to SEQ ID NO:10;
a nucleic acid sequence that hybridizes under stringent conditions to SEQ ID NO:10 or the complement thereof;
a nucleic acid sequence encoding a protein at least about 80% identical to SEQ ID NO:11; and
a nucleic acid sequence encoding a protein that is immunoreactive with an antibody prepared using SEQ ID NO:11 as an antigen, the antibody being immunoreactive with SEQ ID NO:11.
13. A genetically transformed plant cell comprising in the 5' to 3' direction:
 - a) a promoter that directs transcription of a structural nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein;

- b) a structural nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein; wherein the structural nucleic acid sequence is selected from the group consisting of:
 - a nucleic acid sequence at least about 80% identical to SEQ ID NO:10;
 - a nucleic acid sequence that hybridizes under stringent conditions to SEQ ID NO:10 or the complement thereof;
 - a nucleic acid sequence encoding a protein at least about 80% identical to SEQ ID NO:11; and
 - a nucleic acid sequence encoding a protein that is immunoreactive with an antibody prepared using SEQ ID NO:11 as an antigen, the antibody being immunoreactive with SEQ ID NO:11;
 - c) a 3' transcription terminator; and
 - d) a 3' polyadenylation signal sequence that directs the addition of polyadenylate nucleotides to the 3' end of RNA transcribed from the structural nucleic acid sequence.
14. A genetically transformed plant comprising in the 5' to 3' direction:
- a) a promoter that directs transcription of a structural nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein;
 - b) a structural nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein; wherein the structural nucleic acid sequence is selected from the group consisting of:
 - a nucleic acid sequence at least about 80% identical to SEQ ID NO:10;
 - a nucleic acid sequence that hybridizes under stringent conditions to SEQ ID NO:10 or the complement thereof;
 - a nucleic acid sequence encoding a protein at least about 80% identical to SEQ ID NO:11; and
 - a nucleic acid sequence encoding a protein that is immunoreactive with an antibody prepared using SEQ ID NO:11 as an antigen, the antibody being immunoreactive with SEQ ID NO:11;
 - c) a 3' transcription terminator; and
 - d) a 3' polyadenylation signal sequence that directs the addition of polyadenylate nucleotides to the 3' end of RNA transcribed from the structural nucleic acid sequence.
15. A method of preparing host cells useful to produce a polyhydroxyalkanoate synthase protein, the method comprising:
- a) selecting a host cell;
 - b) transforming the selected host cell with a recombinant vector having a structural nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein, wherein the structural nucleic acid sequence is selected from the group consisting of:
 - a nucleic acid sequence at least about 80% identical to SEQ ID NO:10;

- a nucleic acid sequence that hybridizes under stringent conditions to SEQ ID NO:10 or the complement thereof;
 a nucleic acid sequence encoding a protein at least about 80% identical to SEQ ID NO:11; and
 a nucleic acid sequence encoding a protein that is immunoreactive with an antibody prepared using SEQ ID NO:11 as an antigen, the antibody being immunoreactive with SEQ ID NO:11; and
 c) obtaining transformed host cells.
16. A method of preparing plants useful to produce a polyhydroxyalkanoate synthase protein, the method comprising:
 a) selecting a host plant cell;
 b) transforming the selected host plant cell with a recombinant vector having a structural nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein, wherein the structural nucleic acid sequence is selected from the group consisting of:
 a nucleic acid sequence at least about 80% identical to SEQ ID NO:10;
 a nucleic acid sequence that hybridizes under stringent conditions to SEQ ID NO:10 or the complement thereof;
 a nucleic acid sequence encoding a protein at least about 80% identical to SEQ ID NO:11; and
 a nucleic acid sequence encoding a protein that is immunoreactive with an antibody prepared using SEQ ID NO:11 as an antigen, the antibody being immunoreactive with SEQ ID NO:11;
 c) obtaining transformed host plant cells; and
 d) regenerating the transformed host plant cells.
17. A method for the preparation of polyhydroxyalkanoate, the method comprising:
 a) obtaining a cell comprising:
 a nucleic acid sequence encoding a 3-keto-acyl-CoA reductase protein;
 and
 a nucleic acid sequence encoding a PHA synthase protein;
 wherein:
 the nucleic acid sequence encoding a 3-keto-acyl-CoA reductase protein is not naturally found in the cell;
 the nucleic acid sequence encoding a PHA synthase protein is not naturally found in the cell;
 the nucleic acid sequence encoding a 3-keto-acyl-CoA reductase protein is selected from the group consisting of:
 a nucleic acid sequence at least about 80% identical to SEQ ID NO:8;
 a nucleic acid sequence that hybridizes under stringent conditions to SEQ ID NO:8 or the complement thereof;

- a nucleic acid sequence encoding a protein at least about 80% identical to SEQ ID NO:9; and
a nucleic acid sequence encoding a protein that is immunoreactive with an antibody prepared using SEQ ID NO:9 as an antigen, the antibody being immunoreactive with SEQ ID NO:9; and
the nucleic acid sequence encoding a PHA synthase protein is selected from the group consisting of:
a nucleic acid sequence at least about 80% identical to SEQ ID NO:10;
a nucleic acid sequence that hybridizes under stringent conditions to SEQ ID NO:10 or the complement thereof;
a nucleic acid sequence encoding a protein at least about 80% identical to SEQ ID NO:11; and
a nucleic acid sequence encoding a protein that is immunoreactive with an antibody prepared using SEQ ID NO:11 as an antigen, the antibody being immunoreactive with SEQ ID NO:11; and
- b) culturing the cell under conditions suitable for the preparation of polyhydroxyalkanoate.
18. A method for the preparation of polyhydroxyalkanoate, the method comprising:
- a) obtaining a plant comprising:
a nucleic acid sequence encoding a 3-keto-acyl-CoA reductase protein;
and
a nucleic acid sequence encoding a PHA synthase protein;
wherein:
the nucleic acid sequence encoding a 3-keto-acyl-CoA reductase protein is not naturally found in the plant;
the nucleic acid sequence encoding a PHA synthase protein is not naturally found in the plant;
the nucleic acid sequence encoding a 3-keto-acyl-CoA reductase protein is selected from the group consisting of:
a nucleic acid sequence at least about 80% identical to SEQ ID NO:8;
a nucleic acid sequence that hybridizes under stringent conditions to SEQ ID NO:8 or the complement thereof;
a nucleic acid sequence encoding a protein at least about 80% identical to SEQ ID NO:9; and
a nucleic acid sequence encoding a protein that is immunoreactive with an antibody prepared using

SEQ ID NO:9 as an antigen, the antibody being immunoreactive with SEQ ID NO:9; and
the nucleic acid sequence encoding a PHA synthase protein is selected from the group consisting of:
a nucleic acid sequence at least about 80% identical to SEQ ID NO:10;
a nucleic acid sequence that hybridizes under stringent conditions to SEQ ID NO:10 or the complement thereof;
a nucleic acid sequence encoding a protein at least about 80% identical to SEQ ID NO:11; and
a nucleic acid sequence encoding a protein that is immunoreactive with an antibody prepared using SEQ ID NO:11 as an antigen, the antibody being immunoreactive with SEQ ID NO:11; and

- b) growing the plant under conditions suitable for the preparation of polyhydroxyalkanoate.

19. A method for the preparation of polyhydroxyalkanoate, the method comprising:

- a) obtaining a cell comprising:
a nucleic acid sequence encoding a 3-keto-acyl-CoA reductase protein;
and
a nucleic acid sequence encoding a PHA synthase protein;
wherein:
the nucleic acid sequence encoding a 3-keto-acyl-CoA reductase protein is not naturally found in the cell;
the nucleic acid sequence encoding a 3-keto-acyl-CoA reductase protein is selected from the group consisting of:
a nucleic acid sequence at least about 80% identical to SEQ ID NO:8;
a nucleic acid sequence that hybridizes under stringent conditions to SEQ ID NO:8 or the complement thereof;
a nucleic acid sequence encoding a protein at least about 80% identical to SEQ ID NO:9; and
a nucleic acid sequence encoding a protein that is immunoreactive with an antibody prepared using SEQ ID NO:9 as an antigen, the antibody being immunoreactive with SEQ ID NO:9; and
b) culturing the cell under conditions suitable for the preparation of polyhydroxyalkanoate.

20. A method for the preparation of polyhydroxyalkanoate, the method comprising:

- a) obtaining a plant comprising:

a nucleic acid sequence encoding a 3-keto-acyl-CoA reductase protein;
 and
 a nucleic acid sequence encoding a PHA synthase protein;
 wherein:

the nucleic acid sequence encoding a 3-keto-acyl-CoA reductase protein is not naturally found in the plant;
 the nucleic acid sequence encoding a 3-keto-acyl-CoA reductase protein is selected from the group consisting of:
 a nucleic acid sequence at least about 80% identical to SEQ ID NO:8;
 a nucleic acid sequence that hybridizes under stringent conditions to SEQ ID NO:8 or the complement thereof;
 a nucleic acid sequence encoding a protein at least about 80% identical to SEQ ID NO:9; and
 a nucleic acid sequence encoding a protein that is immunoreactive with an antibody prepared using SEQ ID NO:9 as an antigen, the antibody being immunoreactive with SEQ ID NO:9; and

b) growing the plant under conditions suitable for the preparation of polyhydroxyalkanoate.

21. A method for the preparation of polyhydroxyalkanoate, the method comprising:

a) obtaining a cell comprising:
 a nucleic acid sequence encoding a 3-keto-acyl-CoA reductase protein;
 and
 a nucleic acid sequence encoding a PHA synthase protein;
 wherein:
 the nucleic acid sequence encoding a PHA synthase protein is not naturally found in the cell;
 the nucleic acid sequence encoding a PHA synthase protein is selected from the group consisting of:
 a nucleic acid sequence at least about 80% identical to SEQ ID NO:10;
 a nucleic acid sequence that hybridizes under stringent conditions to SEQ ID NO:10 or the complement thereof;
 a nucleic acid sequence encoding a protein at least about 80% identical to SEQ ID NO:11; and
 a nucleic acid sequence encoding a protein that is immunoreactive with an antibody prepared using SEQ ID NO:11 as an antigen, the antibody being immunoreactive with SEQ ID NO:11; and

- b) culturing the cell under conditions suitable for the preparation of polyhydroxyalkanoate.
22. A method for the preparation of polyhydroxyalkanoate, the method comprising:
- a) obtaining a plant comprising:
- a nucleic acid sequence encoding a 3-keto-acyl-CoA reductase protein;
 - and
 - a nucleic acid sequence encoding a PHA synthase protein;
- wherein:
- the nucleic acid sequence encoding a PHA synthase protein is not naturally found in the plant;
 - the nucleic acid sequence encoding a PHA synthase protein is selected from the group consisting of:
 - a nucleic acid sequence at least about 80% identical to SEQ ID NO:10;
 - a nucleic acid sequence that hybridizes under stringent conditions to SEQ ID NO:10 or the complement thereof;
 - a nucleic acid sequence encoding a protein at least about 80% identical to SEQ ID NO:11; and
 - a nucleic acid sequence encoding a protein that is immunoreactive with an antibody prepared using SEQ ID NO:11 as an antigen, the antibody being immunoreactive with SEQ ID NO:11; and
- b) growing the plant under conditions suitable for the preparation of polyhydroxyalkanoate.
23. A method for the preparation of polyhydroxyalkanoate, the method comprising:
- a) obtaining a recombinant host cell comprising:
- a nucleic acid sequence encoding a β -ketothiolase protein;
 - a nucleic acid sequence encoding a 3-ketoacyl-CoA reductase protein;
 - a nucleic acid sequence encoding a polyhydroxyalkanoate synthase protein;
 - a nucleic acid sequence encoding a β -hydroxyacyl-CoA dehydrase; and
 - a nucleic acid sequence encoding an acyl-CoA dehydrogenase protein or an enoyl-CoA reductase protein; and
- b) culturing the recombinant host cell under conditions suitable for the preparation of polyhydroxyalkanoate; wherein:
- the polyhydroxyalkanoate comprises C6, C8, or C10 monomer subunits;
 - the nucleic acid sequence encoding a 3-keto-acyl-CoA reductase protein is selected from the group consisting of:
 - a nucleic acid sequence at least about 80% identical to SEQ ID NO:8;

Add 15

0542000-0107000